Process Engineering Process

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Responsible Office: GSFC Engineering Process Group (EPG)
Title: Process Engineering Process

Asset Type: Process
PAL Number: 3.5

Purpose	The purpose of the Process Engineering Process is to establish and maintain a usable set of organizational process assets for the Information Systems Division (ISD). A second purpose is to provide an ISD-wide framework for planning and implementing organizational process improvement.
Scope	The Goddard EPG is responsible for performing this process, which will be used to establish and maintain all ISD level software policies, processes, and procedures.
Roles and Responsibilities	**GSFC Engineering Process Group (EPG)** • Develops and deploys software policies, processes, procedures, and standards • Initiates, deploys, and monitors ISD process improvements • Evaluates effectiveness of ISD process improvement activities. **Configuration Control Board (CCB)** • Reviews and approves all proposed process assets. • Controls changes to approved process assets. **Product Development Lead (PDL) or Maintenance Technical Lead (MTL)** • Coordinate process engineering activities within a software project • Contribute to the development of process assets • Follow applicable Branch- and Division-level software policies, processes, procedures, and standards on the software project • Assign responsibility to team members for compliance with applicable software policies, processes, procedures, and standards on the software project **Branch Head (BH)** • Support the EPG in moving the Software Process Improvement program forward • Coordinate process engineering activities within the Branch • Ensure that all software projects within the Branch comply with Division-level and Branch-level software policies, processes, procedures, and standards

	• Contribute to the development of process assets • Keep all process assets used within the Branch aligned with applicable Division-level process assets • Assign responsibility to PDLs and MTLs within the Branch for compliance with applicable Branch- and Division-level software policies, processes, procedures, and standards on their software projects **ISD Chief (ISDC)** • Support the GSFC EPG in moving the Software Process Improvement program forward • Direct that ISD software policies, processes, procedures, and standards be followed across all of ISD • Support and encourage software process improvement activities across all of ISD **Appraisal Team (AT)** • Conduct an appraisal according to a specified process model
Usage Scenarios	This process is applicable to all phases of process development, documentation, deployment, and improvement. These phases are not treated here as separate scenarios; they are normally executed cyclically.
Inputs	• Descriptions (written or verbal) of existing processes and procedures • Organizational goals and objectives • Applicable NASA/GSFC software standards • Appraisal benchmarks (e.g., CMMI, ISO) if applicable • Input on experience with prior process improvements (e.g., lessons learned).
Entry Criteria	• Initiation of a process improvement effort *Guidance: This is an iterative process. It generally begins when the decision is made to perform process improvement. Sometimes some initial process improvements have already been identified; more often, though, identification of the desired process improvements is itself a part of this process.* • Some (but not necessarily all) of the required inputs are available.
Exit Criteria	• Process action plans have been fully implemented • All of the required outputs have been produced. • The project or organization is dissolved or retired *Guidance: This process generally continues for the life of an organization.*
Outputs	• Library of approved process assets (PAL) • Improved process assets • Approved process action plans (if applicable) • Process improvement status reports • Action Plan status reports

- Collected and analyzed process lessons-learned
- Appraisals of current processes.

Major Tasks

The following major tasks may be executed sequentially; however, several major tasks will frequently be performed in parallel, or may overlap:

1. Identify organizational process needs and goals for the Division, Branch, or software project. **(EPG, ISDC, BH, or PDL/MTL)**
2. Appraise any existing Division, Branch, or project organization's current processes. **(EPG, AT)**
3. Perform gap analysis to identify required process assets. **(EPG, PDL/MTL)**
4. Identify and prioritize improvements needed to the organization's processes. **(EPG, PDL/MTL)**
5. Establish process action plans. **(EPG, ISDC, BH, PDL/MTL)**
6. Create Process Asset Library. **(EPG, PDL/MTL)**

Guidance: In actuality, this task has already been performed. The PAL is in existence as of this writing. Nonetheless, had this process been in place before we created the PAL, this is where in the process this task should have been performed.

7. Develop and approve new or revised process assets, as needed. **(EPG, PDL/MTL, CCB)**
8. Implement process action plans. **(ISDC, BH, or PDL/MTL)**
9. Deploy organizational process assets. **(EPG, PDL/MTL)**
10. Incorporate process experience into process assets. **(EPG, PDL/MTL)**

Guidance: The Process Engineering process may be performed at the Division, Branch, or project levels. The specific roles involved will vary with the level at which this process is applied. At whatever level this process is performed, though, the process owners are ultimately responsible to the EPG.

Task 1:

Identify organizational process needs and goals for the Division, Branch, or software project. (EPG, ISDC, BH, or PDL/MTL)

a) Interview knowledgeable process users to capture their needs and goals **(EPG)**
b) Collect interview results into a report, with recommendations **(EPG)**
c) Review report and provide feedback **(ISDC, BH, or PDL/MTL)**
d) Iterate on report until it is acceptable **(EPG)**
e) Approve and disseminate report. **(ISDC, BH, or PDL/MTL)**

GUIDANCE: The EPG should encourage each ISD Division, Branch, and software project to maintain its own list of process needs and goals.

Task 2:

Appraise any existing Division, Branch, or project organization's current processes. (EPG, AT)

a) Identify model (e.g., CMMI or ISO 9001-2000) to be used for appraisal **(EPG)**
b) Identify appraisal team and team lead **(EPG)**

c) Gather information from relevant documents **(AT)**

d) Interview project personnel to collect and validate information **(AT)**

e) Write up report and findings **(AT)**

f) Present report and findings to Branch, project, or other organization being appraised. **(AT)**

Guidance: CMMI, ISO 9001, or any other applicable model may serve as the basis for this appraisal. CMMI is preferred but not required.

Task 3: **Perform gap analysis to identify required process assets. (EPG, PDL/MTL)**

Review the results of the process appraisal.

a) Determine which processes, as currently implemented, fall short of the requirements of the chosen model

b) Identify the required actions or process assets that could help close the gaps.

c) Document the results of the gap analysis.

Guidance: This task should be revisited periodically. Once the most critical gaps have been filled, the gap analysis should be repeated to identify the next most critical set of required process assets.

Task 4: **Identify and prioritize improvements needed to the organization's processes. (EPG, PDL/MTL)**

a) Review the results of Tasks 2 and 3 above.

b) Identify needed improvements.

c) Review and prioritize these needed improvements.

Guidance: This task, like Task 3 above, will need to be revisited periodically. Identification and prioritization of improvements needed may – and frequently does – take place concurrently with other Major Tasks.

Task 5: **Establish process action plans. (EPG, ISDC, BH, PDL/MTL)**

a) Review the results of Tasks 3 and 4 above. **(EPG)**

b) Prepare a process action plan that reflects the prioritized improvements needed for each organization's processes, and a schedule. **(EPG)**

c) Submit each process action plan to the appropriate next level, and all relevant stakeholders, for review and approval. **(EPG, ISDC, BH, or PDL/MTL)**

Guidance: A process action plan should be prepared at the Division level. All relevant stakeholders need to be involved in the review and approval of the process action plan.

Task 6: **Create Process Asset Library. (EPG, PDL/MTL)**

a) Identify an appropriate (online) location for the PAL.

b) Allocate the necessary storage space.

c) Set up the necessary password protection and other controls.

Guidance: In actuality, this task has already been performed. The PAL is in existence as of this writing. Nonetheless, had this process been in place before we created the PAL, this is where in the process this task should have been performed. Once the most critical gaps have been filled, the gap analysis should be repeated to identify the next most critical set of required process assets.

Task 7: **Develop and approve new or revised process assets, as needed. (EPG, PDL/MTL, CCB)**

Guidance: ISD has developed processes, procedures, and templates to facilitate the development of new or revised process assets. See especially the following process assets in the ISD PAL, available at http://software/process.cfm:

Asset #3.5.1, "ISD Software Process Asset Development or Change Request Process"

Asset #3.5.2, "ISD SW Process Asset Development Process"

Asset #3.5.2.2, "ISD ETVX Diagram Template"

Asset #3.5.2.3, "ISD (Sub-) Process Template"

Asset #3.5.2.4, "ISD Procedure Template"

The first two assets listed above describe the processes for requesting and developing a new process asset. The templates listed above are available to facilitate the development of new process assets.

a) Identify an author for each process asset.
b) Write, review, and revise the required process asset.
c) Approve the process asset for submission to the CCB.
d) Submit process asset to the CCB for approval.
e) Approve and control the process asset **(CCB).**
f) Promote the new (or revised) process asset into the PAL.

Guidance: An ISD Division-level Configuration Control Board (CCB) already exists and controls Division-level process assets. Any branch or project that develops its own tailored process assets should establish its own CCB to approve and control them. This task will need to be revisited periodically. Development and approval of new or revised process assets may take place concurrently with the other Major Tasks.

Task 8: **Implement process action plans. (ISDC, BH, or PDL/MTL)**

a) Perform the activities called for in each organization's respective process action plan.
b) Monitor process action plan activities and resources.
c) Track progress of each activity to completion.
d) Identify problems and manage corrective actions.
e) Periodically report status to the next level of management.

Guidance: The implementation of the process action plan needs to be managed and tracked like any other task on a project. Responsibility for tracking and reporting progress and problem areas must be clearly assigned.

Task 9:

Deploy organizational process assets. (EPG, PDL/MTL)

Deploy the organizational process assets developed under Task 7. The deployment should be in accordance with the priorities identified in Task 4.

Guidance: Deployment goes beyond simply promoting new or revised process assets into the Process Asset Library. That is accomplished in Task 7, step d above. Deployment involves working with the people in the projects and/or organizations, training them in the process assets, and assisting them in adopting these process assets and integrating them into their respective organizational cultures.

a) Identify the target users.

b) Make the users aware that the process is available on the web site.

c) Provide appropriate support: training, template, phone number to call, etc.

d) Determine how to verify the use of the process asset.

e) Go back and check to verify that the process is being used. If it is not, escalate this issue to the appropriate management until it is resolved.

Guidance: Note that the deployment of organizational process assets is related to several of the preceding tasks. The ordering of the major tasks is not necessarily sequential here. Several tasks may be taking place in parallel. In particular, the deployment of organizational process assets may be part of the process action plans being implemented in Task 8.

Task 10:

Incorporate process experience into process assets. (EPG, PDL/MTL)

a) Periodically capture lessons learned during actual use of the process assets by end users.

b) Modify the process assets to incorporate recent process experience and lessons learned.

Guidance: This task, like Tasks 3, 4, and 6 above, will need to be revisited periodically. Incorporation of process experience into process assets may – and frequently does – take place concurrently with other Major Tasks.

Measures

Recommended Measures:

On a quarterly basis, collect the following process engineering measures:

- Number of process appraisals (CMMI, ISO, etc.) conducted within the Division, Branch, or project during the last 3 months
- Number of lessons learned that were submitted
- Number of new or revised process assets approved during the past month
- Number of staff who are aware of the SPI processes
- Number of staff who are actually using the SPI processes
- Effort spent on process engineering activity

Tools and Templates

Recommended Tools:

The following templates (with the exception of the PIID template) are available in the ISD Process Asset Library, at http://software/process.cfm:

Name	Description
ISD Process and Sub-Process Template	This .dot template facilitates the preparation of new processes and sub-processes
ISD Procedure Template	This .dot template facilitates the preparation of new procedures
ISD Guideline Template	This .dot template facilitates the preparation of new guidelines
ISD Checklist Template	This .dot template facilitates the preparation of new checklists
ISD PIID Template	This Excel template facilitates the preparation of new PIIDs

Training

The following courses are recommended for use with this process:

Course Name	Description
"Defining World-Class Processes," Quality Improvement Consultants, Inc. (QIC)	Presents a structured method of defining and documenting software processes
"Model-Based Process Improvement: An Overview," Software Engineering Institute (SEI)	An overview of process improvement concepts, the Software CMM, and CMMI
"Introduction to CMMI," SEI	An introduction to the Capability Maturity Model – Integration (CMMI) and its component processes
"Intermediate Concepts of the Capability Maturity Model – Integrated (CMMI) Models," SEI	A more detailed explanation of CMMI and its component processes and process areas
CMMI Appraisal Team Training	SEI-required training for a team planning to conduct an appraisal

References

List of all relevant resource documents for this process:

- **Glossary:** http://software.gsfc.nasa.gov/glossary.cfm
  Defines common terms used in ISD processes
- **ETVX Diagram:** http://xxxxx.yyyyy.zzzzz
  Insert a hyperlink where the diagram can be found
- **Process Asset Library:** http://software/gsfc.nasa.gov/process.cfm
  Library of all ISD process descriptions
- **CMMI: Guidelines for Process Integration and Product Improvement,** M. B. Chrissis, M. Konrad, S. Shrum. Addison-Wesley (2003). The definitive text on the CMMI and its components.
- **Quality management systems – requirements, ISO 9001:2000, International Organization for Standardization, 2000.**

Quality Management System Records

List of all QMS records for this process:

Controlled Document/Description	Record Custodian
CMMI Appraisal Results and Findings	EPG
Process Asset Library (PAL)	EPG
Process Action Plan for division	EPG
Gap analysis to identify required process assets	EPG
New or revised process assets	EPG

Change History

Version	Date	Description of Improvements
1.0	12/23/05	Initial version approved by CCB